



Republic of North Macedonia

*Broadband Competence Office*

## Report

Implementation of the National Operational Broadband Plan

Broadband development in the country

(period October 2021 - March 2022)

Skopje, March 2022

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## Introduction

Pursuant to amendments to the Law on Electronic Communications (July 2019), the National Broadband Competence Office (NBCO) is defined as expert and advisory body for support of broadband network investments. Pursuant to the Law, NBCO is accountable before the minister of information society and administration for the operation thereof.

The National Broadband Competence Office (NBCO) was established in October 2019 upon decision of the minister of information society and administration and after the Parliament of the Republic of North Macedonia (PRNM) adopted amendments to the Law on Electronic Communications in July 2019 ("Official Gazette of the Republic of North Macedonia" no. 153/2019).

Pursuant to Article 71-a paragraph (2) of the Law on Electronic Communications ("Official Gazette of the Republic of Macedonia", no. 39/2014, 188/2014, 44/2015, 193/2015, 11/2018, 21/2018 and "Official Gazette of the Republic of North Macedonia" no. 98/2019 and 153/2019), NBCO shall assume the following competences:

- Shall participate in the work of the broadband competence office network in the European Union and in the region,
- Shall issue opinions and proposals for faster development of electronic communications, and in particular of broadband in the country,
- Shall cooperate with state authorities, state administrative bodies, public enterprises, local self-government units, public institutions and legal entities with public authorizations and fully state-owned trade, and shall provide support for development plans/projects/studies related to broadband networks, as well as support in implementation thereof,
- Shall issue opinions and proposals for utilization and needed development of fibre-optic infrastructure that has been constructed or is to be constructed with public funds,
- Shall participate in establishment of target areas that would use state aid in construction and development of broadband networks,
- Shall issue opinions and proposals during construction of broadband networks with utilization of state aid for: potential technical solutions, investment and business models, criteria for selection of operator, price policy and related issues,
- Shall participate, issue opinions and proposals in preparation of plans for promotion of broadband in the country,
- Shall participate in public discussions and consultations related to construction of broadband networks with utilization of state aid,
- Shall participate in determining free WiFi internet access locations in municipalities,
- Shall participate, issue opinions and proposals in development of future national strategic documents and development plans related to broadband development,
- Shall monitor implementation of adopted national strategic document and plans for broadband development in the state, meeting national broadband targets set forth therein and shall issue opinions and proposals for review thereof,
- Shall, at least semiannually, deliver a report to the minister of information society and administration on broadband development in the country related to development of broadband market in the European Union pursuant to DESI (The Digital Economy and Society Index), as well as report on implementation of adopted strategic documents and plans for broadband development in the country, meeting of national broadband goals set forth therein.

## Implementation of National Operational Broadband Plan in the period October 2021- March 2021

The National Operational Broadband Plan 2019-2029 (NOBP) was adopted on 01.04.2019 by the Government of RNM and is published on the designated website of the Ministry of Information Society and Administration (MISA): <https://mioa.gov.mk/?q=mk/node/2457><sup>1</sup>.

NOBP is aligned with strategic goals of the EU's initiative "Digital Agenda for Europe", as rooftop strategy for development of information society 2010 and EU's strategy "Towards a European Gigabit Society for 2025" from 2016.

NOBP was lodged to the European Commission and to the World Bank that have both issued positive opinions thereto.

### Activities conducted by NBCO in NOBP implementation

According to the Rules of Procedure of the National Broadband Competence Office (NBCO) in the event of an emergency, the NBCO sessions are held through electronic means of communication that enable the use of audio and video communication platforms.

Pursuant to Article 71-b of the Law on Electronic Communications, NBCO consists of seven members, one of whom is the president of the NBCO. Due to the resignations of two members, during the period October 2021 until the middle of March 2022, Due to the resignations of two members, NBCO consisted and operated with five members, when the Minister of Information Society and Administration has elected one more member for NBCO, which leaves one free vacancy within the NBCO.

In the period from October 2021 to March 31<sup>st</sup>, NBCO held a total of 10 meetings. Also, several meetings were held with relevant and concerned institutions in view of implementing the National Operational Broadband Plan (NOBP).

The NBCO sessions were attended by all members of the NBCO, independent experts (depending on the agenda), all employees of the Communications Department, and representatives from the Cabinet of the Minister / Deputy Minister of MISA, as well as the State Secretary were also invited herein.

As before, a representative from the EU Office in Skopje, a representative from the Office of the Prime Minister was invited to the NBCO's meetings, and representatives of other institutions, Agency for Electronic Communications, Ministry of Transport and Communications, etc were also invited at some meetings (depending on the meeting agenda).

The minutes of all sessions were regularly archived and published on the NBCO's website. Also, public announcements regarding NKBK's sessions and meetings with other institutions were regularly posted on the NKBK website.

Technical and administrative support for NBCO's operation was continuously provided by the staff of the Communications Department. The employees of the Communications Department prepared the minutes, the announcements to the public, they were translated into Albanian, and then posted on NBCO's website (<https://bco.mioa.gov.mk/>).

During October 2021, the NBCO held two meetings (35th and 36th meeting), members of the NBCO participated in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO.

Namely, in October 2021:

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<sup>1</sup> eng: <https://mioa.gov.mk/?q=en/node/2459>

- Members of the NBCO participated in the hybrid meeting organized by the RCC on the topic "Development of broadband and 5G in the Western Balkans";
- A discussion was opened regarding the amendments to the Rulebook of the Agency for Electronic Communications on the manner of construction of public electronic communication networks and associated means. The proposed amendments to the Rulebook were explained by the AEC representatives.
- NBCO's proposals regarding the latest version of the **draft text of the Law on Network Security and Information Systems (LNSIS)** were adopted thereof. The proposals of the NBCO refer to the members of LNSIS that are related to the legal competencies of the NBCO and are aimed at harmonizing with the draft text of the National ICT Strategy, NBCO, the Law on the Establishment of PE MRD, Government Work Program 2020-2024, The Law on Electronic Communications, as well as the opinions and recommendations adopted by the NBCO. The proposals were officially lodged to the Minister and the Deputy Minister of Information Society and Administration and were published on the official NBCO's website.

During November 2021, the NBCO held two meetings (37th and 38th meeting), members of the NBCO took part in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO.

Namely, in November 2021:

- On November 30, 2021, members of the NBCO in Skopje participated in a consultative meeting on regional digital activities in 2022 (organized by the RCC). The representatives of the NBCO presented the activities in the field of digital infrastructure and connectivity in 2021 which should be an integral part of the "CRM report on implementation 2021". The meeting had a rich discussion concerning the achieved results and the planned activities in view of the broadband in our country.
- There was a discussion regarding the preparation of opinion with recommendations on the amendments to the AEC's Rulebook on the manner of construction of public electronic communications networks and accompanying assets.

During December 2021, the NBCO held two meetings (39th and 40th meeting), members of the NBCO took place in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO. Namely, in December 2021:

- in the period 18.12.-19.12.2021, members of the NBCO took part in an online seminar of the company Ibis instruments, with presentations and active discussions on 5G, GPON trends, monitoring of critical infrastructure and network synchronization;
- NBCO's **Opinion with recommendations for amending the Rulebook** on the manner of construction of public electronic communication networks and accompanying assets of the Agency for Electronic Communications was adopted thereto. The recommendations refer to the fact that in the Rulebook:
  - o Rules should be laid down for the joint use of public electronic communications networks and accompanying assets that should be applied in the planning, design, construction, application and maintenance phases thereto.
  - o the purpose and subject of the regulation should be amended, as well as the scope of the data that would be requested from the operators,
  - o can not contain a material that is already regulated by the Law on Construction,
  - o the list of standards should be exempted from the Rulebook,
  - o data can not be requested from an operator prior or as a condition for securing communication networks and they must be proportionate and objective for the purpose for which they will be used thereto.

The opinion was officially lodged to the Minister and the Deputy Minister of Information Society and Administration, the Director of AEC, and was published on the NBCO's official website.

- NBCO's **Opinion on the proposed amendments to the Law on determining** the Status of Illegally Constructed Buildings was adopted thereto. According to its opinion, the NBCO proposes amendments and supplements to the law with definitions for cable ducts, cable shaft, cable gallery, antenna system, electronic communication cable and installation in a building. The opinion was officially lodged to the Minister and the Deputy Minister of

Information Society and Administration, the Minister of Transport and Communications and published on NBCO's official website.

- There was a discussion with regards to the latest DESI Broadband Development Report in the EU member states for 2021. Namely, some indicators were deleted and new ones were introduced. Having this in mind, the NBCO has come to a conclusion that it would need to adopt amendments to the Methodology for Determining the Digital Economy and Society Index and the Form and Content Form that should be contained in the Report.
- There was a discussion regarding the latest proposals of the European Commission on the rules for using state aid for the construction of broadband networks, taking into account the latest EU strategy until 2030 - Digital Compass.

During January 2022, the NBCO held one meeting (41st meeting), members of the NCBC participated in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO.

Namely, in January 2022 there was a discussion regarding:

- The program of the new Government. In the Program of the new Government, the emphasis is placed on digitalization and in that direction the NBCO reiterated the need to develop a government state optical network, ie the National Transport Optical Network (NTON) in accordance with the NOBP. The development of NTON should be preceded by a Feasibility Study (which would be funded by the Government) and the same should be harmonized with other strategic documents in the country, ie. with the National ICT Strategy and the competencies of the Digital Agency, NBCO and PE MRD defined by law.
- AEC's information that the tender procedure for issuing approvals for use of radio frequencies for 5G has been stopped, due to the initiated procedure before the Commission for Protection of Competition.
- measures / obligations that the Government should undertake and implement (2022-2023), in accordance with the table submitted by the Roadmap for price reduction for roaming EU - WB6. The Roadmap contains measures related to the implementation of the NOBP, and in particular to reduce the costs of developing broadband networks and to ensure the use of state infrastructure for the needs of operators for the development of broadband networks and services.

During February 2022, the NBCO held one meeting (42nd meeting), and there was continuous communication between members and external experts on certain issues within the competence of the NBCO. Namely, at the 42nd NBCO's meeting, there was a discussion regarding the amendments of the Methodology for determining the Digital Economy and Society Index DESI - Digital Economy and Society Index.

In the newly drafted methodology for DESI by the EC, one of the five dimensions has been deleted, that is the dimension of Internet use, which is indirectly already contained in the other dimensions. The "connectivity" dimension (monitored by the NBCO) has undergone several changes, namely the fixed broadband coverage indicator has been deleted and new VHCN (Very High Capacity Network) and 5G coverage indicators have been added. The members of the NBCO stated it is necessary to indicate the source i.e. institution that is the source of data for the relevant indicator (AEC, State Statistical Office, etc.) in the draft methodology for DESI for RNM in the dimension "connectivity". Alignment should also be made with AEC regarding the data on the new indicators contained in the "connectivity" dimension for DESI which should be provided by the operators when preparing the semi-annual reports of the NBCO according to the new methodology.

During March 2022, the NBCO held two meetings (the 43rd and 44th meeting) and there was continuous communication between the members and external experts on certain issues within the competence of the NBCO. Namely, in March 2022:

- There was a discussion regarding the financing for the preparation of the Feasibility Study for construction of the National Transport Optical Network, and then the financing of its construction;
- The **fifth Report of the NBCO on the broadband development in the country and the implementation of the NOBP was adopted** therein;
- Members of the NBCO took part in the meeting organized by MISA and AEC with the four largest operators (with the largest network infrastructure) on the topic: providing simplified procedures for obtaining construction approvals

of electronic communications infrastructure, according to the lodged Roadmap for roaming price reduction between EU and the Western Balkans.

### Participation of NBCO members on webinars organized by the European BCO network

Pursuant to Article 71-a of the Law on Electronic Communications, the NBCO participates in the operation of the network of broadband competence offices in the European Union and in the region.

European BCO network has been established in order to promote the exchange of knowledge and experience between the European Broadband Competence Office (BCO), as well as to overcome obstacles for broadband projects and capacity building in the areas of financing, planning and broadband policies. The European BCO Network has an annual program of activities for key areas of interest, which includes organizing link events, training materials and publications, and seminars on policy, funding, good practice, and broadband issues.

During the period October 2021 – March 2022, NBCO's members have actively participated on the following events, organized by the European BCO network:

- On October 26, 2021, the annual conference of the European BCO Network was held online, marking the 5th anniversary of its establishment by addressing important policies and the development of EU funding, as well as the key achievements and goals of the BCO. Topics of discussion at the conference were the digital future of rural areas, gigabit goals and the Digital Compass, EU Structural Funds and the Recovery and Resilience Facility, state aid and emerging technologies and CEF2 Digital.
- Series 6 comprised of the following webinars:
  - On November 23, 2021, a webinar entitled "Ex-post evaluation of the implementation of state aid measures" was presented, where the study on the ex-post evaluation of the implementation of state aid measures in France was presented thereat.
  - On December 9, 2021, a webinar entitled "New Guidelines for State Aid for Broadband" where a representative of the EC - DG Competition presented the new Guidelines for State Aid prepared by the EC and is up for public debate until February 11, 2022, and the same contains guidelines about the cases when state aid for broadband is activated and under what conditions therein.
  - On January 18, 2022, a webinar entitled "Mapping in context of a new state aid guidelines", presenting in which cases mapping can be useful in activating the state aid mechanism, as well as mapping the infrastructure for mobile, 5G and FWA and fixed broadband infrastructure.
- CEF Digital comprised of the following sessions:
  - On February 2, 2022, the first of the three sessions entitled "New Generation of Calls", which shared information about the newly opened calls of CEF Digital, as well as a detailed overview of the CEF Digital program, the competent services for the implementation of the CEF Digital program, the role of BCO in the CEF Digital program, as well as clarification of support measures, 5G corridors, global gateways and cloud and edge computing therein.

## Activities conducted by AEC in NOBP implementation

### Introduction of 5G

After obtaining the consent of the Government, the Purpose Plan and the Plan for Allocation and Utilization of radio frequencies were adopted in March 2021. This implements new decisions and recommendations of CEPT, ITU and harmonization with the common European Schedule of Allocation, as well as enabling the introduction of 5G in the "pioneering" radio frequency bands defined by the European Commission. The Plans also enable technological neutrality of the allocated bands, ie the operators can use 5G technology in the already assigned bands.

The DD2 radio frequency coordination process with Serbia, Bulgaria and Greece has been completed within the SEDDIF group. The coordination process with Albania is technically complete. A bilateral agreement remains to be officially signed.

On 31.10.2020, Makedonski Telekom completed the process of 12-month testing of its 5G network in the radio frequency band 3.6-3.7 GHz.

A1 Macedonia until September 21, 2022 conducts 12-month testing of its 5G network in the radio frequency band 3.6-3.7 GHz.

The status-quo with the so-called 5G pioneer bands in RN Macedonia is as follows:

#### **- 700 MHz band: 60 MHz (703-733 & 758-788 MHz.)**

The process of releasing this band ended on 01.02.2020, ie the DVB-T channels from this band were moved to lower radio frequencies. There are currently no radio frequency users in this band, ie all 60 MHz can be assigned. The amendments in the Purpose Plan and the Plan for Allocation and Utilization of radio frequencies from 2021 lays down the terms and conditions for utilization of this band for 5G.

AEC has not yet assigned 5G radio frequencies in this band.

#### **- 3.6 GHz band: 400 MHz (3 400-3 800 MHz)**

300 MHz are planned to be used for 5G from this band. AEC has issued a temporary approval for the utilization of radio frequencies for 5G testing. The approval was issued to A1 Macedonia for the radio frequency band 3.6-3.7 GHz (100 MHz) with a validity period until 20.09.2022.

#### **- 26 GHz band: 1000 MHz (24 250-27 500 MHz)**

There are 1000 MHz available for assigning 5G operators in the RN Macedonia, which were offered to interested parties, but no one was interested in assigning them thereout. AEC has not yet assigned 5G radio frequencies in this band.

On November 23, 2021, the Director of AEC has adopted a decision to announce a public call with public bidding for granting approvals for utilization of radio frequencies from the radio frequency bands 700 MHz and 3.x GHz. The deadline for submission of bids was 29.12.2021. On December 17, 2021, the Commission for Protection of Competition informed the AEC that a procedure for assessing the eligibility for granting state aid had been initiated therein. Therefore, on December 27, 2021, the director of AEC has adopted a decision to terminate the procedure initiated by virtue of the decision to announce a public call with public bidding. The Commission for Protection of Competition has not yet informed the Agency regarding the result of the procedure.

According to the Law on Electronic Communications, AEC measures non-ionizing radiation caused by the utilization of public electronic communications networks. AEC has measured their non-ionizing radiation for both 5G test networks. You can find the reports at the following link:

- [https://aek.mk/wp-content/uploads/2020/06/Izvestaj\\_od\\_merenje\\_na\\_nejoniziracko\\_zracenje-AEK-5G-NR.pdf](https://aek.mk/wp-content/uploads/2020/06/Izvestaj_od_merenje_na_nejoniziracko_zracenje-AEK-5G-NR.pdf)
- <https://aek.mk/wp-content/uploads/2021/10/20211028-Izvestaj-od-merenje-na-nejoniziracko-zracenje-A1-Makedonija-AEK-5G-NR.pdf>

### Fixed Broadband activity development

On December 3, 2021, the Director of AEC has adopted a decision to select a universal service provider for access to a fixed location and provision of telephone services. This universal service also includes fixed location internet access at a speed of 12 Mbps.

## Report on Broadband Development in the Country

Pursuant to the Law on Electronic Communication, NBCO shall *“at least semiannually, deliver a report to the minister of information society and administration about development of broadband in the country relative to development of the broadband market in the European Union, pursuant to DESI (The Digital Economy and Society Index), and report on implementation of adopted strategic documents and plan for broadband development in the country, meeting national broadband targets set forth therein”*.

In order to meet this obligation, in February 2020 NBCO adopted the “Methodology Determining the Digital Economy and Society Index in the Republic of North Macedonia” and Template on the Form and Content of the Broadband Market Development Report Pursuant to DESI. ([www.bco.mioa.gov.mk](http://www.bco.mioa.gov.mk))

The Methodology is based on EU’s DESI Methodology from 2014 and, according to this Methodology, NBCO is competent to monitor only the dimension “Connectivity”.

During the meeting held on 22.06.2020, NBCO adopted amendments to the Template on the Form and Content that should be covered under the Report on Development of the Broadband Market pursuant to DESI, with a view to reorganize data to streamline comparison of the indicator “Coverage” for RNM with corresponding indicators of EU member states.

This Report is prepared pursuant to the adopted Template on the Form and Content of the Broadband Market Development Report Pursuant to DESI (consolidated text) ([www.bco.mioa.gov.mk](http://www.bco.mioa.gov.mk)).

When preparing the Report on broadband market development in the dimension “Connectivity”, as source of information for specific sub-dimensions and indicators, NBCO used data from:

- Agency for Electronic Communications, predominantly,
- State Statistical Office<sup>2</sup>,
- National Bank,
- (The Roadmap for lowering Roaming Charges between EU and WB).

Note:

The European Commission (EC) published the DESI2021 Report on November 12, 2021, along with a new methodology according to which, there are amendments in the dimensions, sub-dimensions and individual indicators that make up DESI

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<sup>2</sup> The official data of the State Statistical Office according to the 2002 Census are used for demographic data

2021. In January 2022, the NBCO has initiated a procedure for harmonization of the "The Methodology for Determining the Digital Economy and Society Index in the Republic of North Macedonia "with the EC Methodology for DESI 2021. After the adoption of the new methodology for the Republic of North Macedonia, the above stated institutions will be harmonized, as they are source of data for indicators in the "Connectivity" dimension of the EC Methodology for DESI 2021 to start providing data for new indicators therein.

This Report compares indicators for RNM with the "DESI 2020"<sup>3</sup> Report published by the European Commission (EC) on 11.06.2020, and the DESI 2021 Report Connectivity"<sup>4</sup> which was published by the European Commission (EC) on 12.11.2021.

## Connectivity – indicators

The indicators in the "Connectivity" dimension for RNM are shown in Chart 1.

Chart 1. Indicators in the "Connectivity" dimension (March/2022)

Indicators	Description	Unit	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date
1a1 Fixed broadband coverage (basic and/or NGA)	% of broadband covered households: xDSL, cable, FTTP WiMax or LTE networks	% of households	97.87% (Q1/2019)	97.87% (Q1/2019)	99.08% (Q4/2020)	99.48% (Q2/2021)	99.48% (Q2/2021)
1a2 Fixed broadband take-up (basic and/or NGA)	% of households subscribed to broadband: xDSL, cable, FTTP, WiMax or LTE networks	% of households	70.91% (Q3/2019)	72.95% (Q1/2020)	73.58% (Q3/2020)	75.79% (Q1/2021)	77.92% (Q3/2021)
1b1 4G coverage	% of settlements with 4G coverage: measured as medium coverage of telecommunication operators in every country	% of households	99.365% (Q4/2019)	99.38% (Q2/2020)	99.395% (Q4/2020)	99.395% (Q2/2021)	99.395% (Q4/2021)
1b2 Mobile broadband take-up	Number of mobile internet subscribers per 100 inhabitants	Subscribers per 100 inhabitants	70.06% (Q3/2019)	64.83% (Q1/2020)	64.95% (Q3/2020)	66.78% (Q1/2021)	75.83% (Q3/2021)
1b3 Preparedness for 5G	Portion of the spectrum intended and awarded for 5G utilization by the end of 2020 in so-called 5G pioneer bands. These bands include 700 MHz (703-733 MHz and 758-788 MHz), 3.6 GHz (3400-3800 MHz) and 26 GHz (1000 MHz in 24250-27500 MHz). All three frequency bands have equal weight	% of harmonized spectrum	0%	22.2% (14.07.2020)	22.2%	22.2%	22.2%

<sup>3</sup> <https://digital-strategy.ec.europa.eu/en/policies/desi>

<sup>4</sup> <https://digital-strategy.ec.europa.eu/en/policies/desi-connectivity>

1c1 Fast broadband take-up (NGA)	% of households covered with broadband with at least 30 Mbps download speed. Affected technologies include FTTH, FTTB, cable Docsis 3.0 and VDSL	% of households	78% (Q1/2019)	78% (Q1/2019)	82.84% (Q4/2020)	82.84% (Q4/2020)	82.84% (Q4/2020)
1c2 Fast broadband take-up	% of households subscribed to broadband with at least 30 Mbps	% of households	21.03% (Q3/2019)	27.43% (Q1/2020)	28.27% (Q3/2020)	29.89% (Q1/2021)	32.62% (Q3/2021)
1d1 Ultra fast broadband coverage (NGA)	% of households subscribed to broadband with at least 100 Mbps download speed. Affected technologies include FTTH, FTTB and cable Docsis 3.0	% of households	43.8% (Q1/2019)	43.8% (Q1/2019)	63.10% (Q4/2020)	63.10% (Q4/2020)	63.10% (Q4/2020)
1d2 Ultra-fast broadband take-up	% of households subscribed to broadband with at least 100 Mbps	% of households	0.98% (Q3/2019)	1.74% (Q1/2020)	1.81% (Q3/2020)	1.97% (Q1/2021)	2.32% (Q3/2021)
1e1 Broadband price index	Broadband price index	Scale (0-100)					

## Comparison with indicators of EU member states

### • Total revenues of telecom operators (in denars without VAT)

The data on the total revenues of the operators refer to 2020 and are shown in Chart 2.

Table 2. Incomes from telecommunication services

Service	Revenues in 2018 (mkd)	Revenues in 2019 (mkd)	Revenues in 2020 (mkd)
Fixed telephony	2,131,578,000.00	2,026,590,000.00	2,004,000,000.00
Fixed internet access	3,990,676,000.00	4,126,204,000.00	4,145,699,000.00
Mobile telephony	6,823,893,000.00	7,076,195,000.00	7,007,180,000.00
Mobile internet access	1,468,488,000.00	1,628,726,000.00	1,622,939,000.00
Business Internet users	555,277,292.00	489,512,212.00	507,696,976.00

Source\_ Agency for Electronic Communication (AEC)

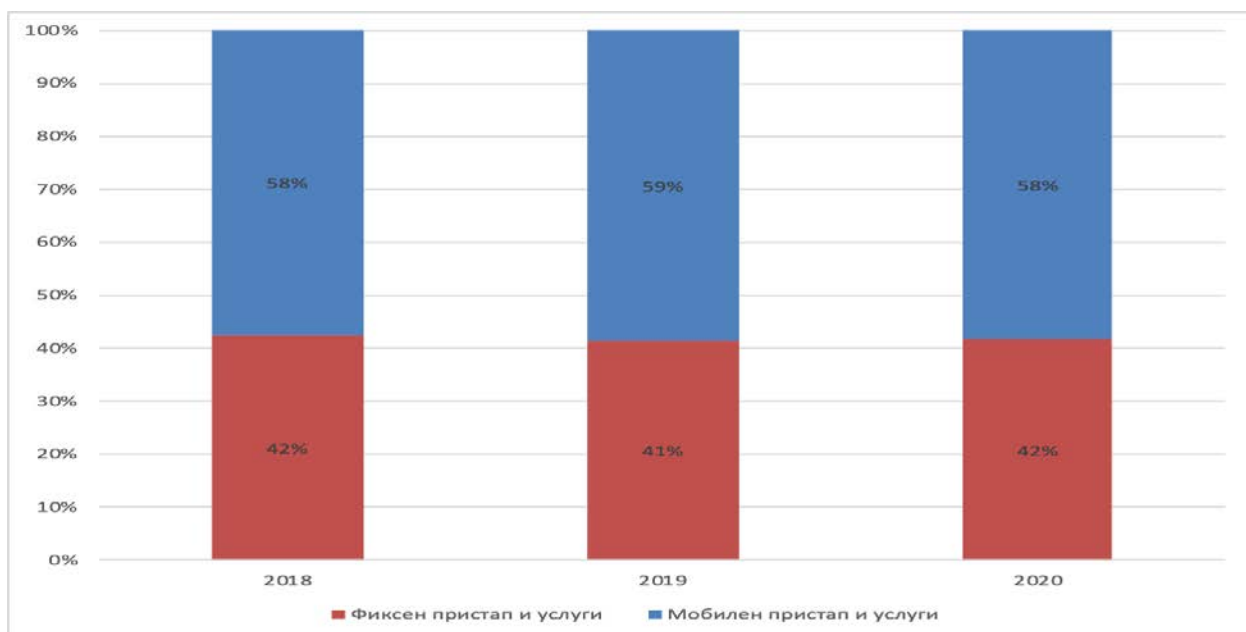


Figure 1: Share of revenues from telecommunication services (Source: AEC))

### • Broadband coverage

Broadband infrastructure coverage data were obtained from the NOBP Implementation Support System launched by the Agency for Electronic Communications in December 2020. In the NOBP Implementation Support System starting from September 2021, the categorization of all settlements in RNM (total 1,783) was performed according to the nomenclature of the State Statistical Agency.<sup>5</sup>

#### A. Fixed broadband coverage

##### Indicator 1a1

561,372 households have fixed broadband coverage or 99.48% of the total number of households in RNM have the opportunity to use fixed broadband (basic and / or NGA). 99.395% of households located in rural areas have access to fixed broadband (basic and / or NGA).

<sup>5</sup> <https://www.stat.gov.mk/OblastOpsto.aspx?id=1>

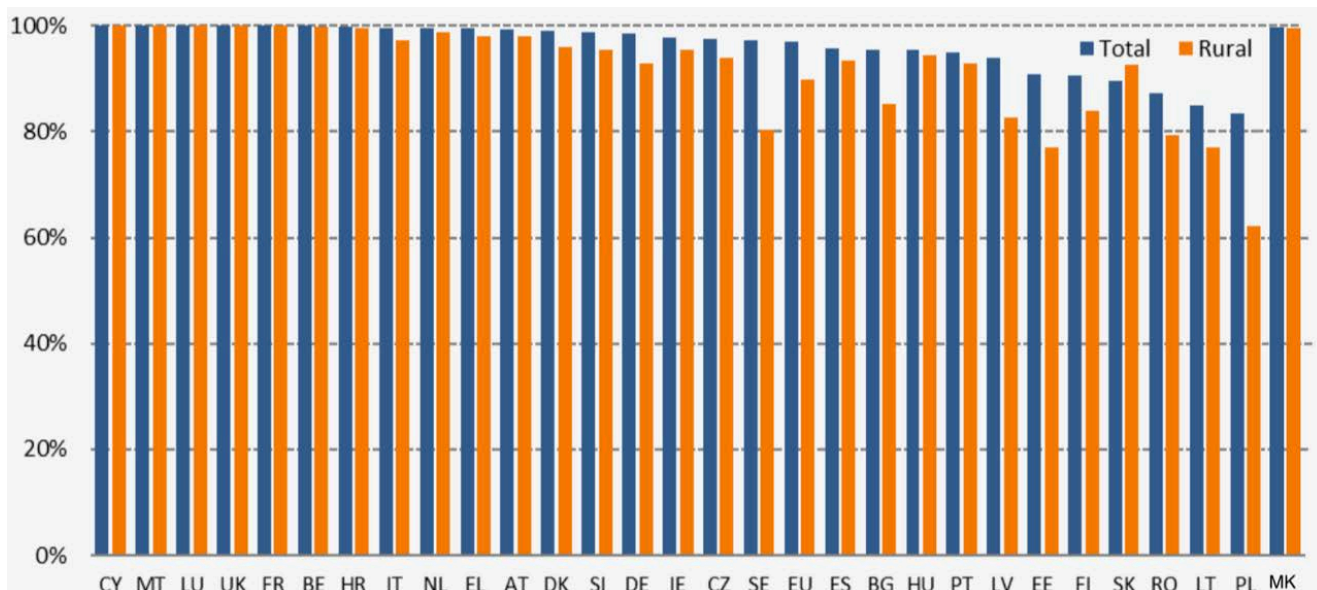


Figure 2: Fixed broadband coverage (% of households) (Source: EC (mid-2019), AEC (Q2 / 2021))

Indicator 1s1

Fixed fast broadband coverage (download with a speed of at least 30 Mbps and not more than 100 Mbps) has 467,599 households or 82.84% of the total number of households in RNM. Of these, 131,627 households or 23.32% of the total number of households in RNM are in rural settlements.

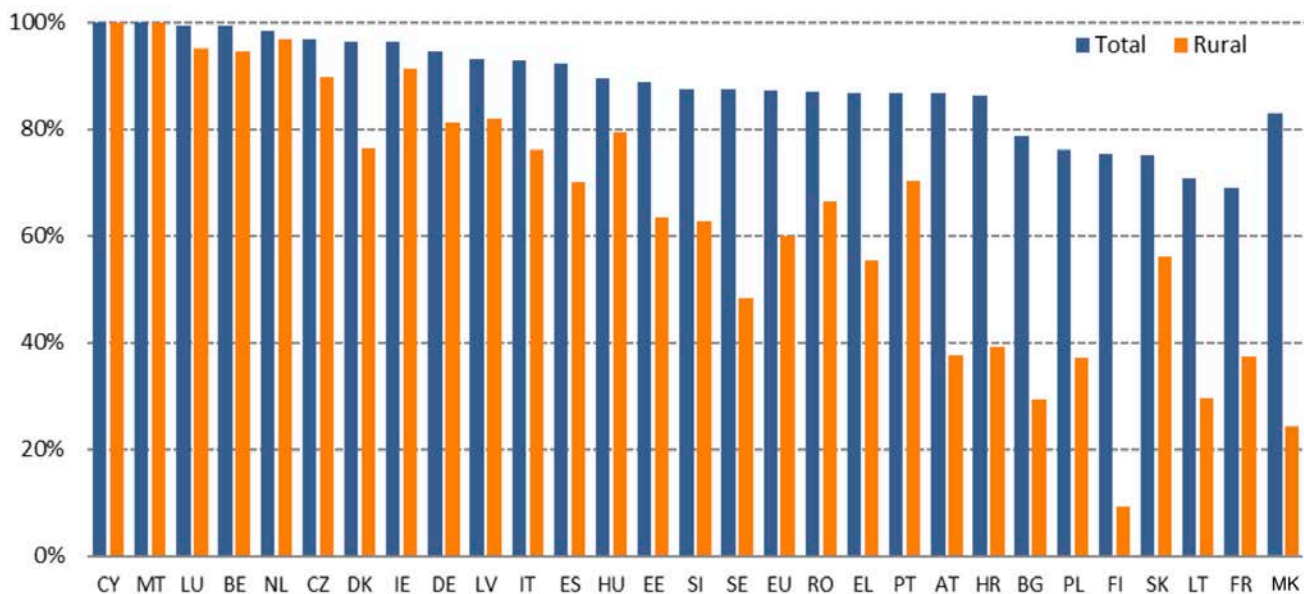


Figure 3: Coverage with fast broadband networks (% of households) (Source: EC -2021), AEC (Q4 / 2020))

Indicator 1d1

Fixed ultra-fast broadband coverage (download with a speed of at least 100 Mbps) has 356,212 households or 63.10% of the total number of households in RNM. Of these, 65,974 households or 11.69% of the total number of households in RNM are in rural settlements.

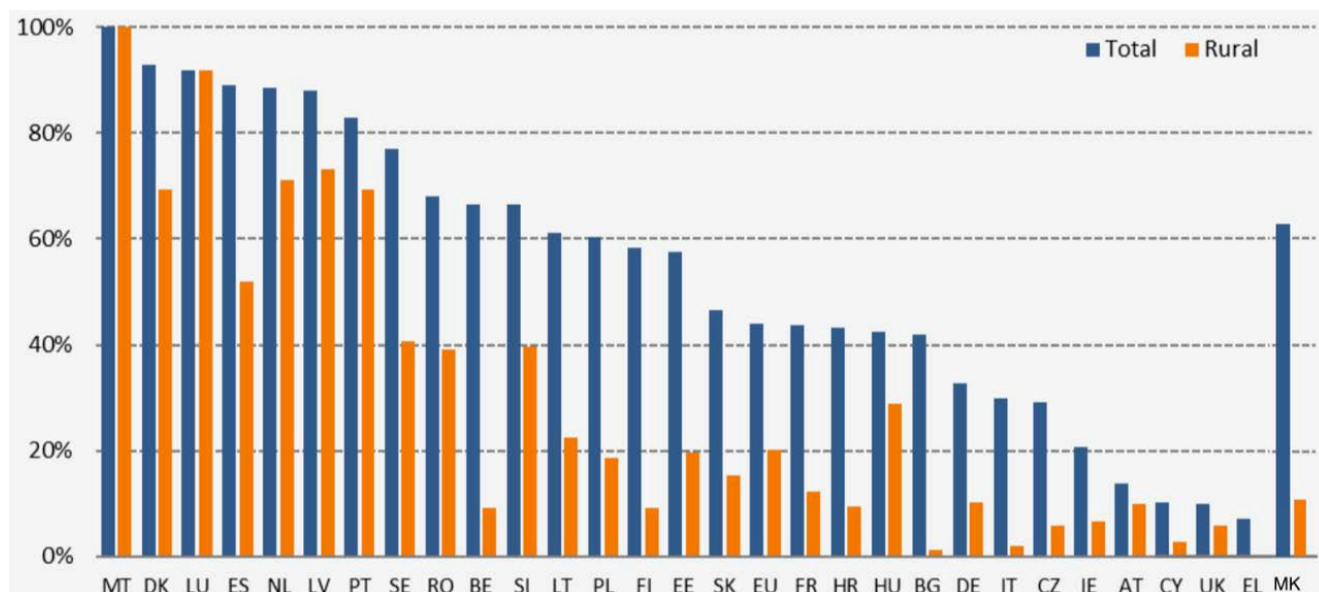


Figure 4: Coverage with ultra-fast broadband networks (% of households)

(Source: EC (mid-2019), AEC (Q4 / 2020))

## B. Mobile Broadband Coverage

### Indicator 1b1

In RNM, 99.58% of the population is covered by 4G (LTE) network (by at least one mobile operator). The average availability of 4G (as an average value of the coverage of the two mobile operators) is 99.395% of the population in RNM.

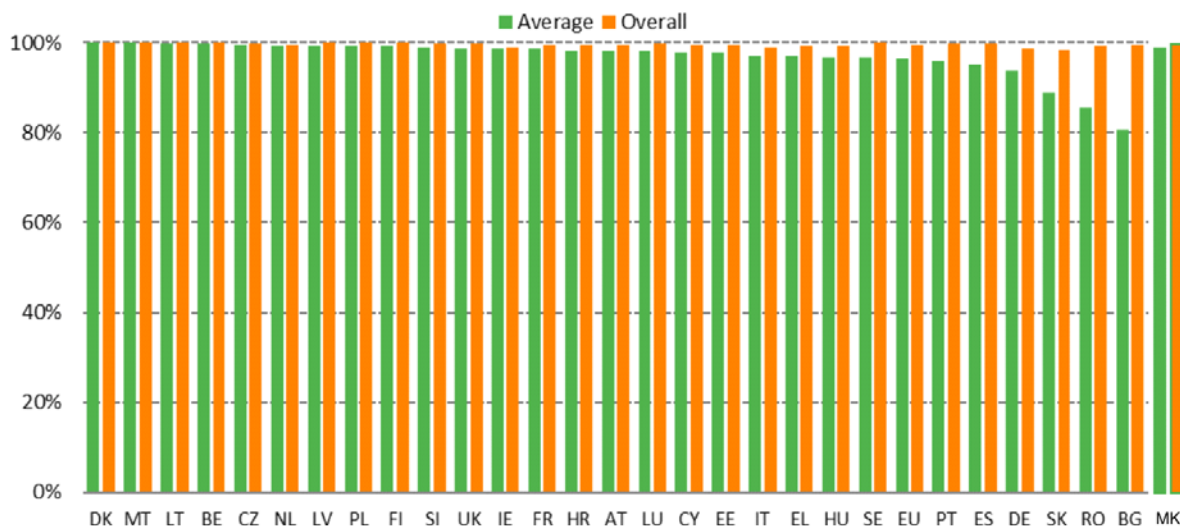
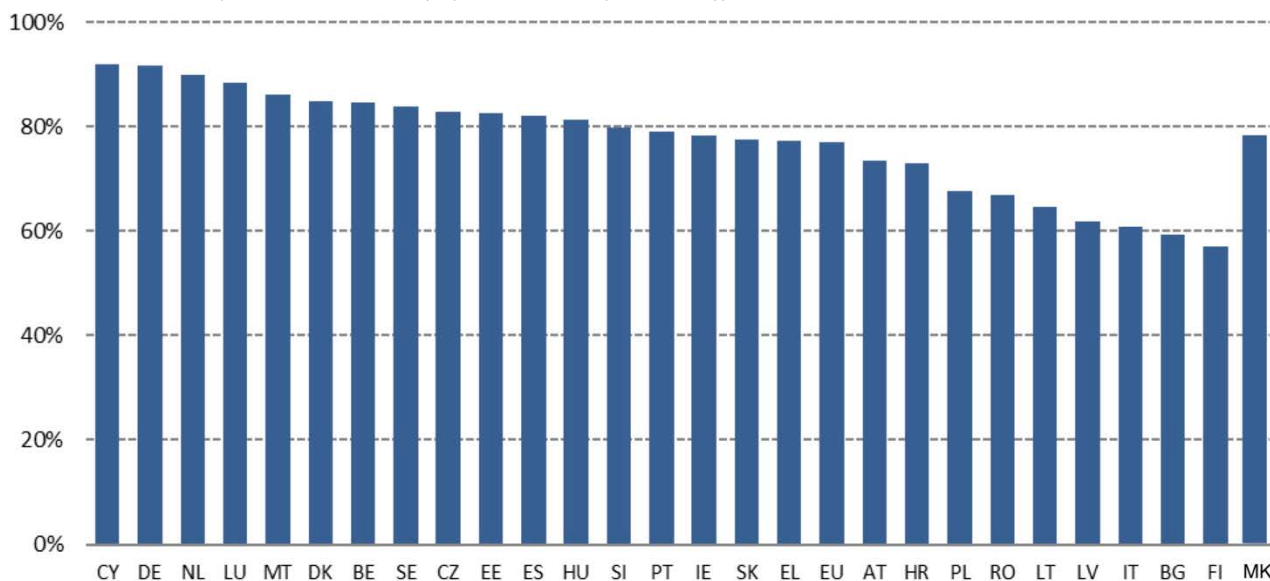


Figure 5: 4G coverage, in percentage of population (Source: EC (mid-2019), AEC (Q4 / 2021))

- Fixed broadband take-up prevalence (fixed broadband take-up) (% of households)

#### Indicator 1a2

The prevalence of fixed broadband for Q3 / 2021 is **77.92%**, ie **439.718** households in RNM have a subscriber agreement for fixed broadband (basic and / or NGA). (Source: AEK (Q1 / 2021))



Слика 6: Fixed broadband household subscribers (Source: Eurostat (2020), AEK(Q3/2021))

The prevalence of fixed broadband in the period from the first NCBC report from March / 2020 to this NBCO report, March / 2021 marks the following increase, as shown in Figure 7.

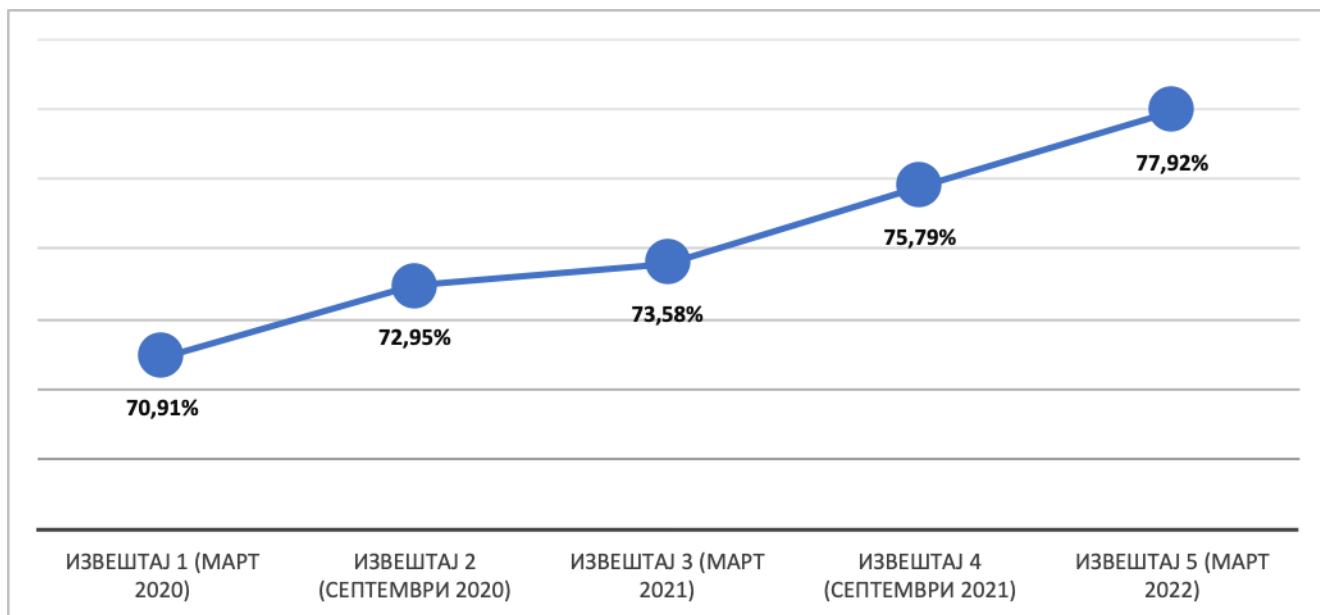


Figure 7: Change in the number of households subscribers of fixed broadband in RNM (Source: AEC)

#### • Prevalence of fast broadband take-up (% of households)

##### Indicator 1c2

The prevalence of fast broadband for Q3 / 2021 is 32.62%, ie 184,107 households have a subscriber agreement for fixed broadband with a download speed of at least 30 Mbps and less than 100Mbps. (Source: Agency for Electronic Communications)

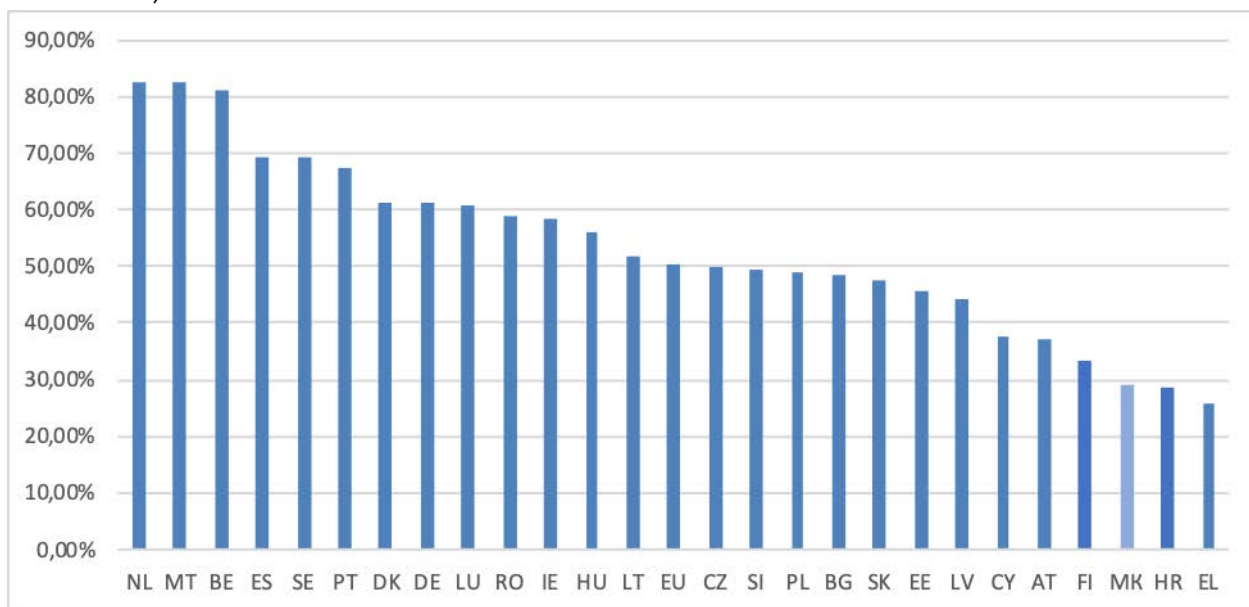


Figure 8: Households subscribers of fixed fast broadband  
(Sources: Digital Agenda for Europe (2019), AEC (Q3 / 2021))

The prevalence of fixed fast broadband in the period from the first NCBO report from March / 2020 to this NCBO report, March / 2021 marks the following increase, as shown in Figure

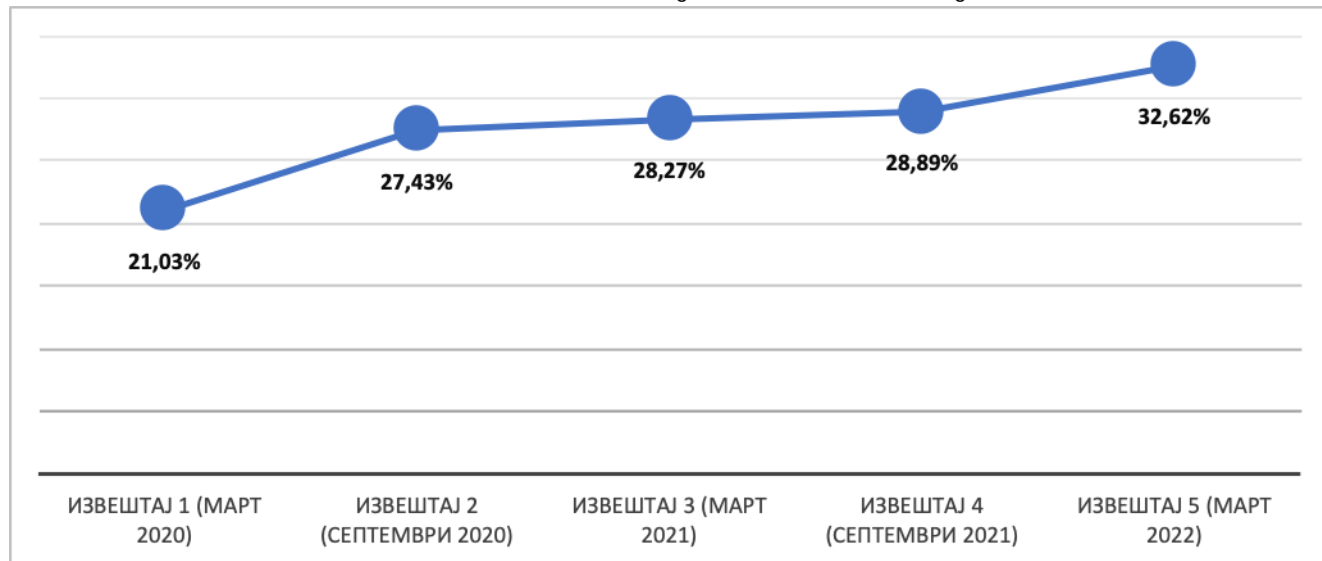


Figure 9: Change in the number of households subscribers of fixed fast broadband in RNM (Source: AEC)

### Prevalence of ultrafast broadband take-up (% of households)

#### Indicator 1d2

The prevalence of ultrafast broadband for Q3 / 2021 is 2.32%, ie 13.102 households have a subscriber agreement for fixed broadband with a download speed of at least 100 Mbps. (Source: Agency for Electronic Communications)

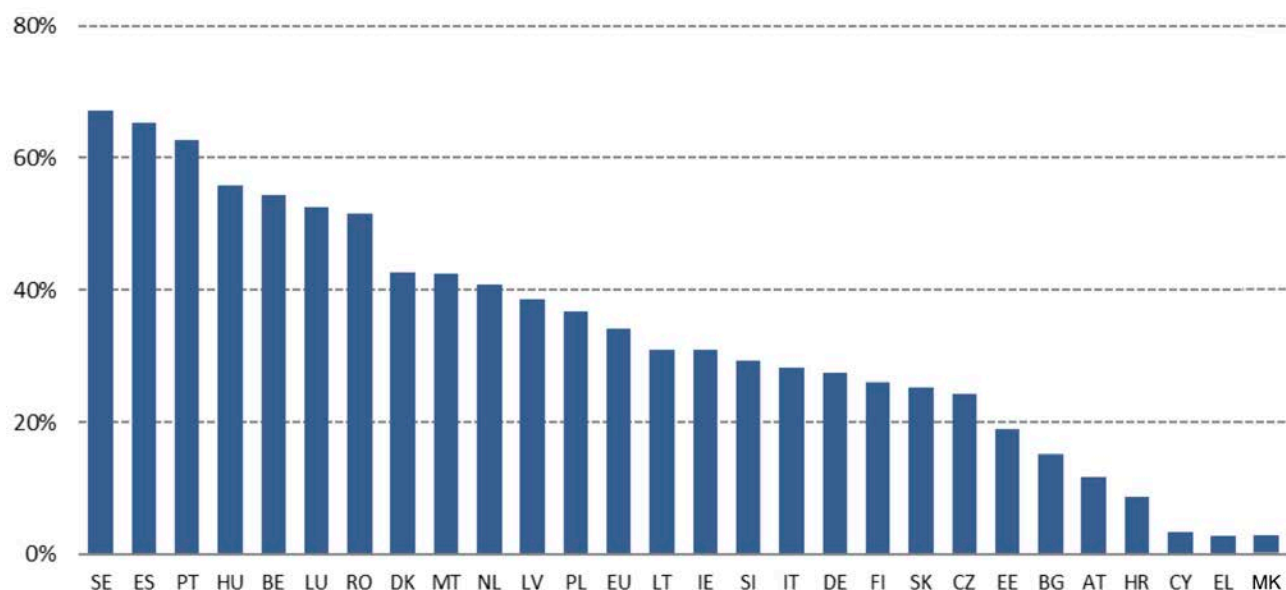


Figure 10: Households subscribers of fixed ultrafast broadband (Source: EK (2020), AEC (Q3/2021))

The prevalence of fixed ultrafast broadband in the period from the first NCBO report from March / 2020 to this NCBO report, March / 2022 marks the following increase, as shown in Figure 11

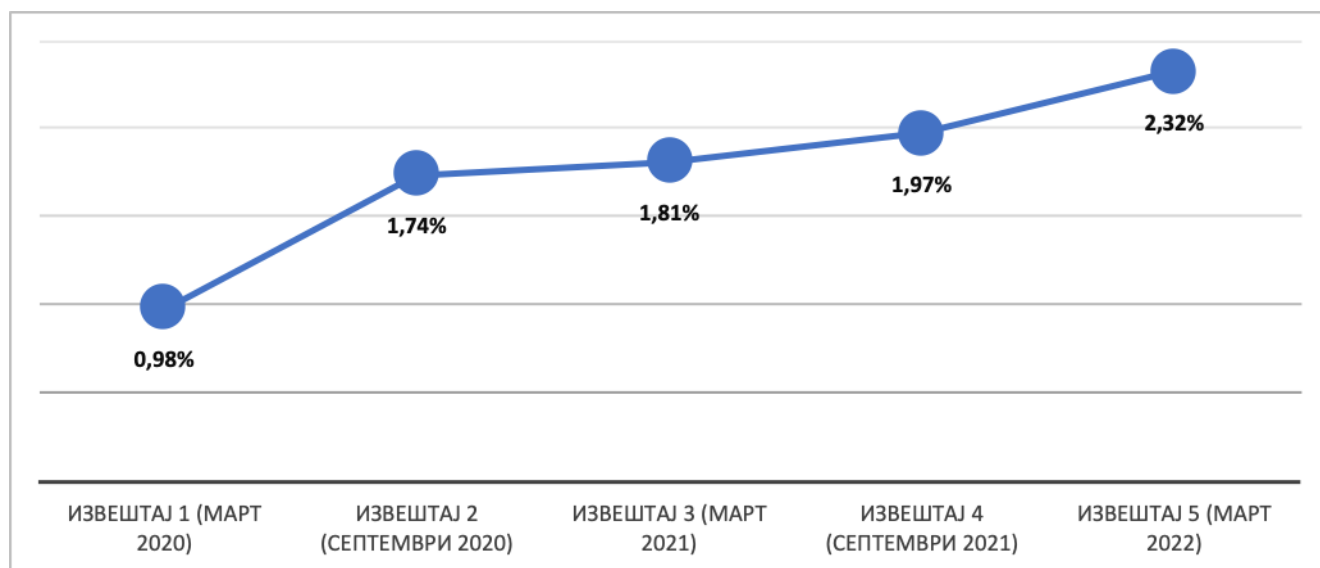


Figure 11: Change in the number of households subscribers of fixed ultrafast broadband in RNM (Source: AEC)

#### • Fixed broadband distribution, market share based on technology

Chart 3 shows the percentage of fixed broadband technology used:

Chart 3. Market share of fixed broadband based on technology

Technology	Market share (%) (March/2020)	Market share (%) (September/2020)	Market share (%) (March/2021)	Market share (%) (September/2021)	Market share (%) (March/2022)
DSL (VDSL included)	30.75	29.14	28.22	26.75	25.33
Cable (with Docsis 3.0 included)	34.29	33.29	31.99	30.37	29.75
FTTH + B	13.87	15.45	17.04	19.66	21.05
Other (LL-Leased Lines, LAN, Fix LTE)	21.09	22.12	22.75	23.22	23.87

Source: Agency for Electronic Communications

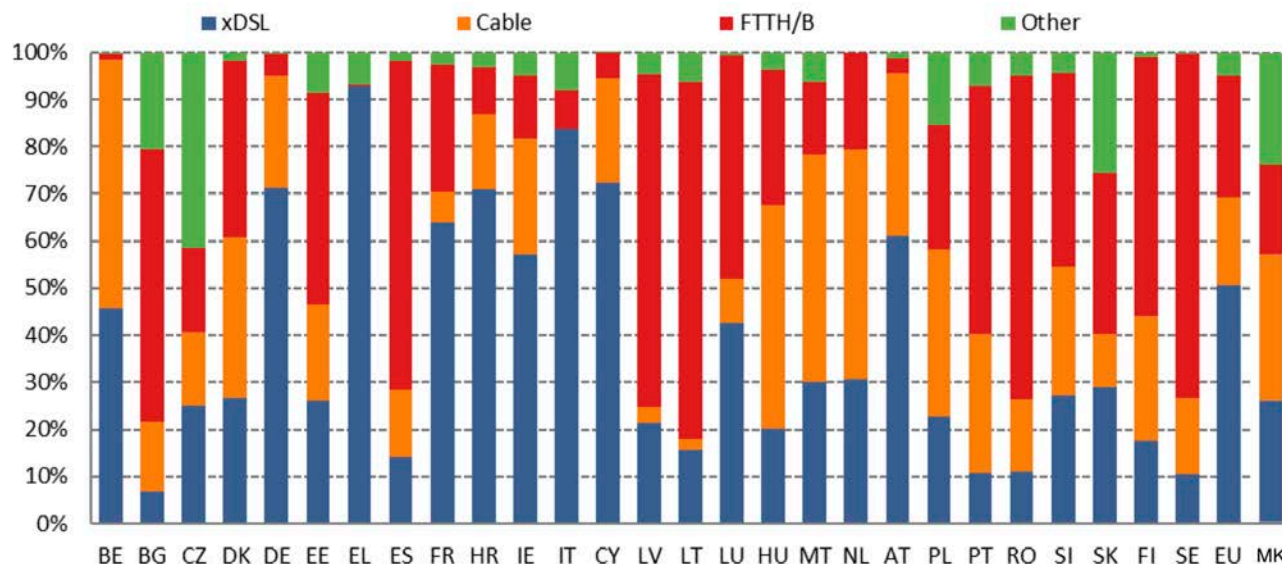


Figure 12: Technologies used to provide fixed broadband  
Sources: Eurostat (July / 2020), AEC (Q3 / 2021)

The share of optical access (FTTH + B) in the total number of fixed broadband subscribers in RNM with 21.05% is at a comparable level of the average value of the share of optical access in the 28 EU member states which is 26% (according to the EC Report "DESI 2021" from 2021).

Although at the EU average level the dominant technology is xDSL where the main competing technology is cable with Docsis 3.0 (according to the EC Report "DESI 2021" from 2021), in RNM the cable technology Docsis 3.0 has surpassed xDSL technology.

In RNM, the percentage of NGA subscriber agreements (download speed of at least 30 Mbps) in relation to the total number of subscriber agreements for fixed broadband in the country is 44.56% and the same in the period from the first report of NBCO, March / 2020 to this report of NBCO, March / 2022 records a continuous increase.

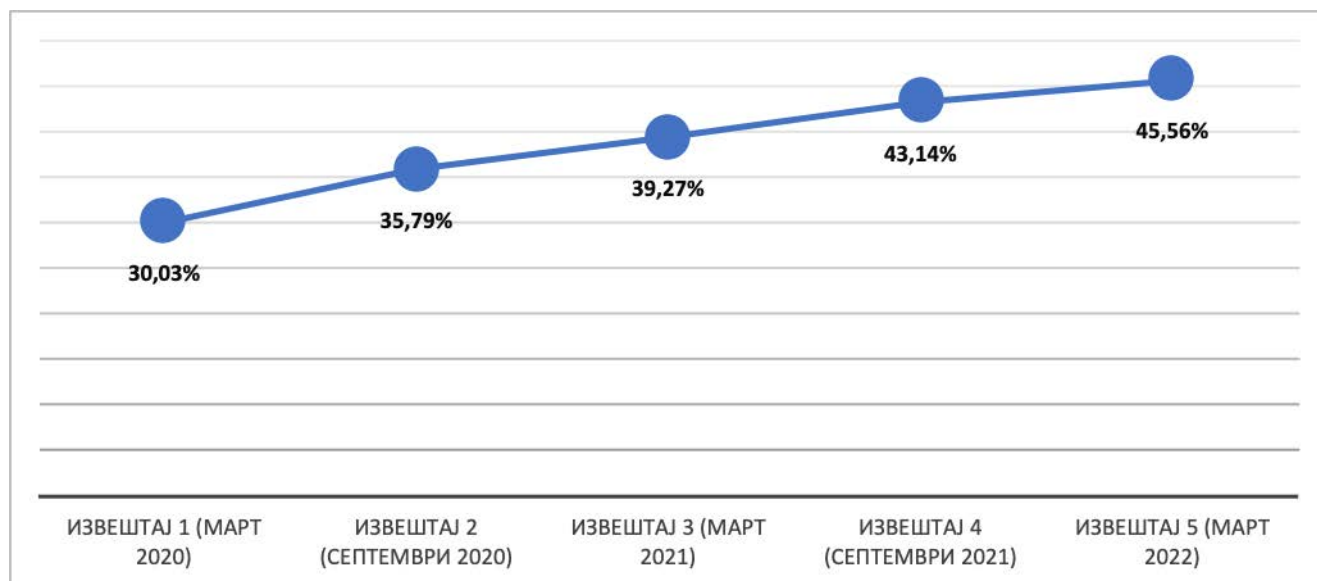


Figure 13: Change of the share of NGA subscriber agreements in RNM (Source: AEC)

## • Competition in the fixed broadband market

In RNM, the share of the traditional (incumbent) operator "Makedonski Telekom" on the fixed broadband market in Q3 / 2021 according to the total number of subscribers (residential and business) according to all technologies for fixed broadband access is 40.09%, while the share of new emerging operators on the fixed broadband market is 59.19%.

(Source: Agency for Electronic Communications)

This ratio in terms of market share between traditional and emerging operators in RNM is according to the average of the 28 EU member states (according to the EC Report "DESI 2021" from 2021), where traditional telecom operators still control 40% of subscribers

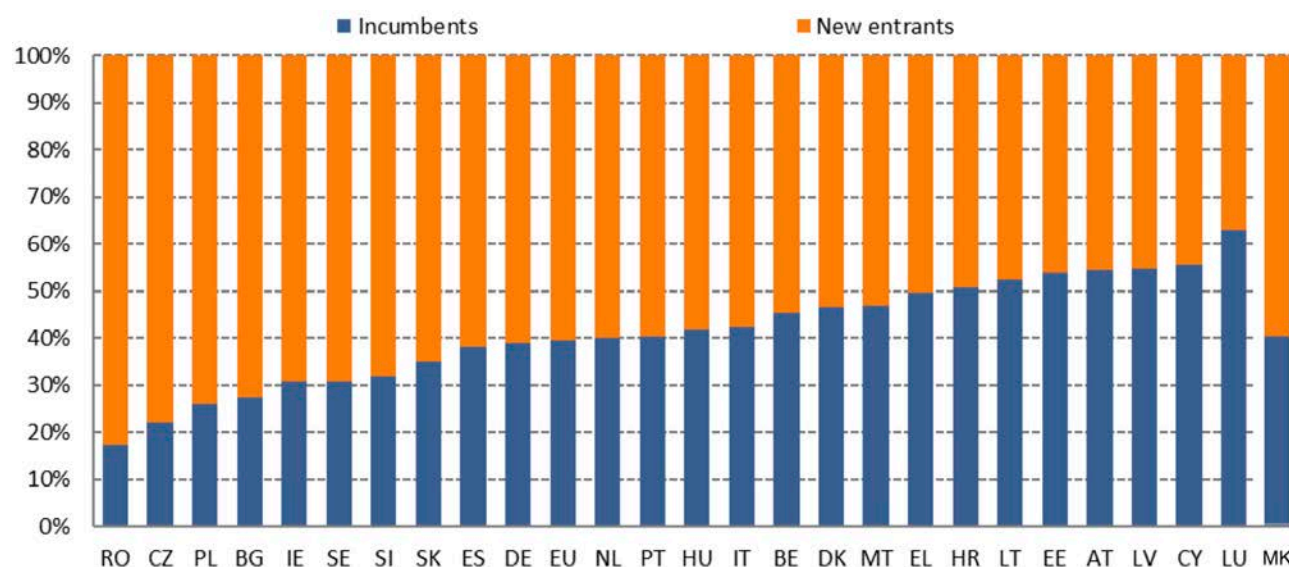


Figure 14: Fixed broadband market share by number of subscribers (Sources: EC (July / 2020), AEC (Q3 / 2021))

## Mobile broadband distribution (subscribers per 100 inhabitants)

### Indicator 1b2

The prevalence of mobile broadband for Q3 / 2021 is 75.83%, ie the total number of subscribers who use mobile broadband is 1.568.813 Source: Agency for Electronic Communications

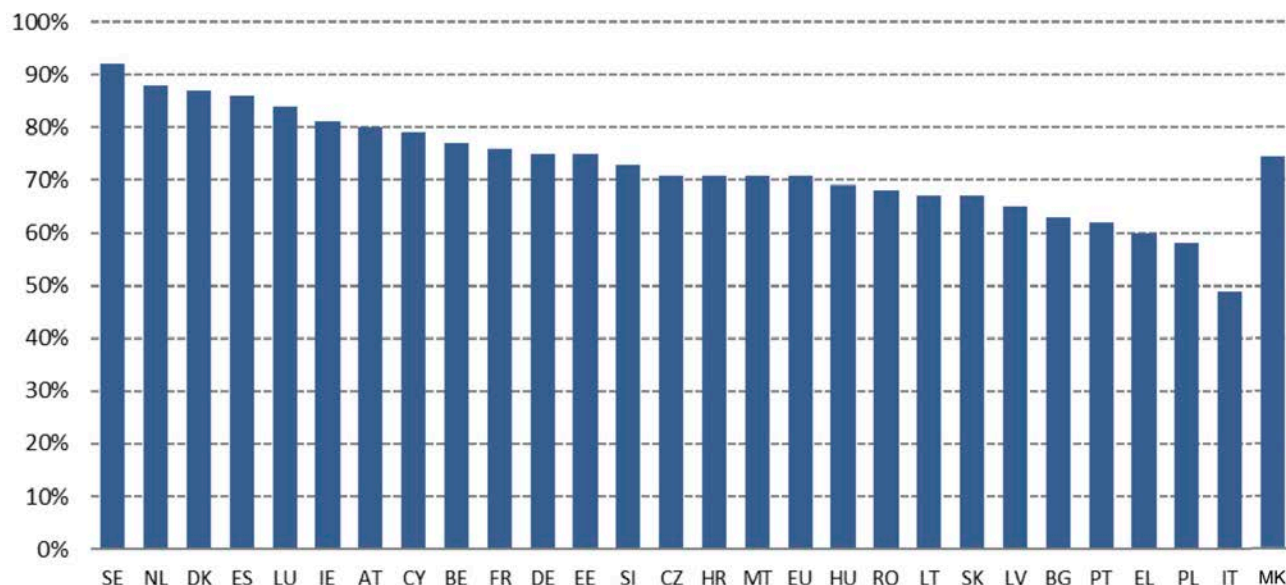


Figure 15: Mobile Broadband Distribution (Sources: EC 2021), AEC (Q3 / 2021))

## Internet (IP) traffic per resident

A. Fixed broadband internet traffic per household during one month is 185.05 GB. (Source: Agency for Electronic Communications)

The average fixed broadband internet traffic per household during one month in the period from the first NBCO report from March / 2020 to this NBCO report, March / 2022 records the following increase, as shown in Figure 16

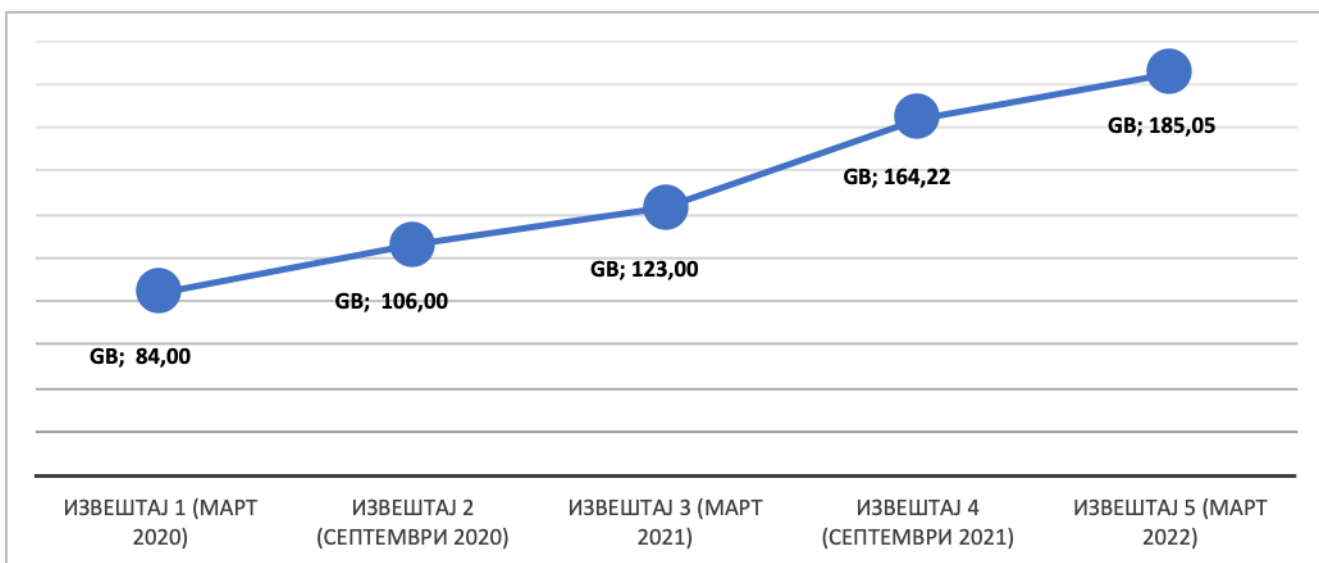


Figure 16: Change of fixed broadband internet traffic per household in RNM (Source: AEC)

B. Mobile broadband internet traffic per subscriber who uses mobile internet during a month is 5.1 GB.  
(Source: Agency for Electronic Communications)

The average mobile broadband internet traffic per subscriber during one month in the period from the first report of the NBCO from March / 2020 to this report of the NBCO, March / 2022 records the following increase, as shown in Figure 17.

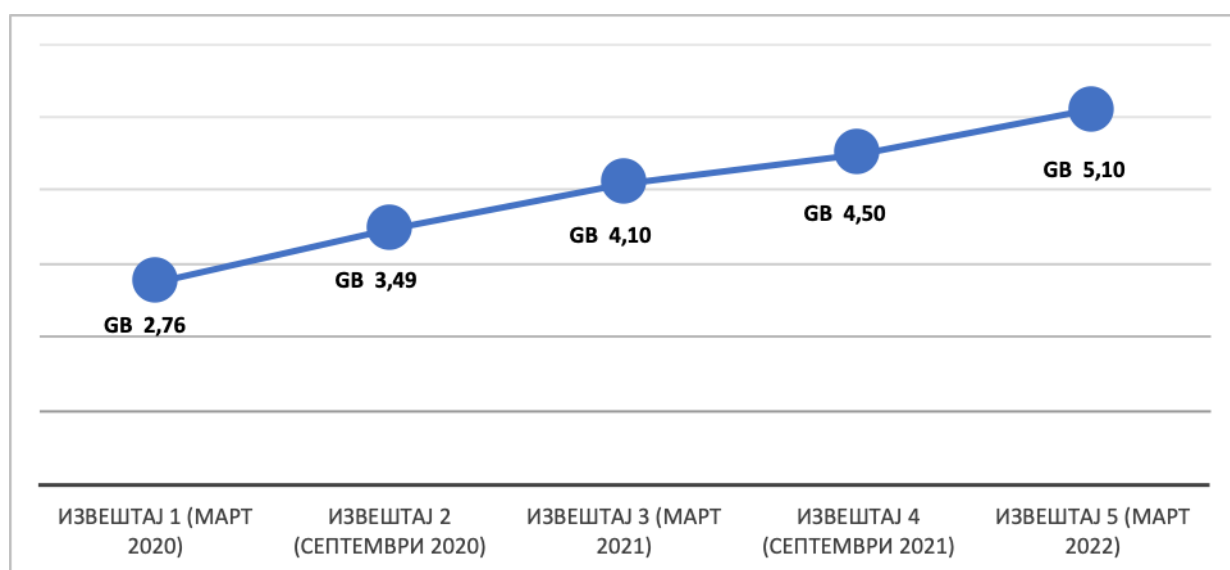


Figure 17: Change of mobile broadband internet traffic per subscriber in RNM (Source: AEC)

## Broadband price index

### Indicator 1e1

In the analysis of the retail prices offered on the market of fixed broadband services in RNM, the OECD methodology "Revised OECD telecommunication price baskets" from December 2017 was used, according to which the retail offers of the three first ranked operators are analyzed according to the market share by number of users, whose common total market share is at least 70%.

The analysis of the retail prices on the market of fixed broadband services in this report included the retail offers of the operators "Makedonski Telekom", "A1 Macedonia" and "TRD ROBI - Telekabel", which together in Q3 / 2021 have an 87.11% share of fixed broadband market according to the number of subscribers.

The lowest offers for three categories of speeds (12-30 Mbps, 30-100 Mbps and at least 1000 Mbps) and three types of products in the carts (standalone internet, internet + fixed telephony and internet + TV + fixed telephony), adjusted according to the parity of Purchasing Power Parity (PPP) is shown in Chart 4.

Note: The total market share of fixed broadband according to the number of subscribers of the three first ranked operators "Makedonski Telekom", "A1 Makedonija" and "TRD ROBI - Telekabel", compared to the first report of NBCO from March / 2020 (86.5%) does not show a big change (+/- 1%).

The value of 1 Euro = 61.6968 MKD (Source: National Bank)

The value of the purchasing power parity for RNM is calculated according to the data of the International Monetary Fund at 2.6315554.

Chart 4. Broadband price index

Category	Internet		Internet and fixed telephony		Internet + TV + f.telephony	
	Offer	The lowest price	Offer		Offer	The lowest price
12-30 Mbps	Cable Internet Lightspeed 30/1	500 MKD 8.1 EUR 21.56 (PPP)	A1 Net Neon 15/1	599 MKD 9.70 EUR 25.83 (PPP)	A1 Combo Neon up to 15/1 Mbps	799 MKD 13.00 EUR 35.74 (PPP)
30-100 Mbps	Internet L standalone 100 Mbps/100 Mbps	1499 MKD 24.3 EUR 63.94 (PPP)	A1 Net Neo S up to 50/3 Mbps	799 MKD 13.00 EUR 34.45 (PPP)	A1 Combo Neo 4M 50/3 Mbps	1199 MKD 19.43 EUR 53.63 (PPP)
>100 Mbps	Optic 150/150	1000 MKD 16.3 EUR 43.12 (PPP)	Optic 150/150	1150 MKD 18.7 EUR 49.59 (PPP)	Optic 150/150	1600 MKD 26.0 EUR 68.99 (PPP)

- Number of active subscribers to fixed broadband - at affordable speed

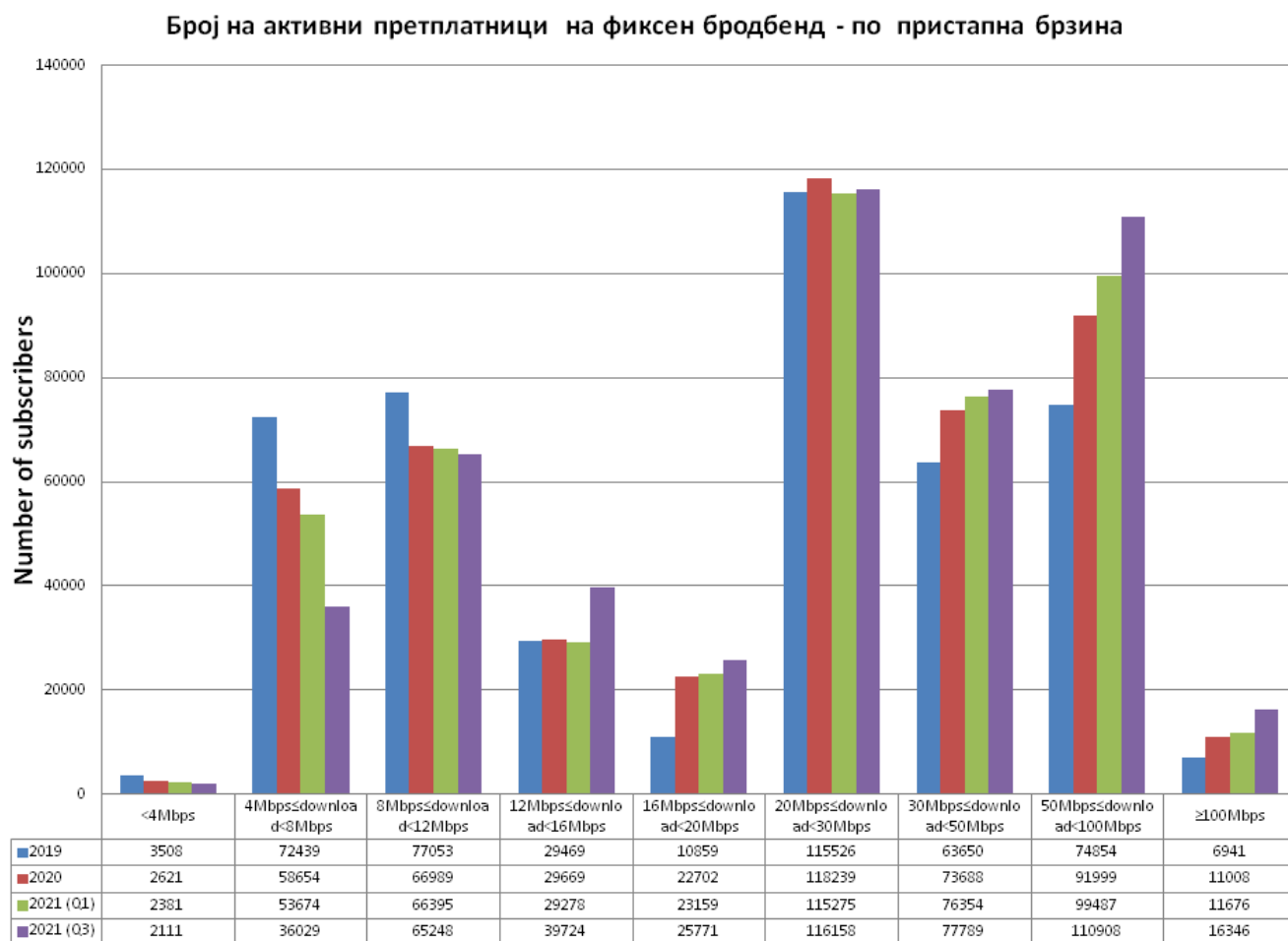


Figure 18: Number of active fixed broadband subscribers by access speed (Source: AEC (Q3 / 2021))

From the graph of Figure 18 it can be concluded that in the period 2019 - third quarter 2021 the number of subscriber agreements with access to basic broadband (download <30 Mbps) significantly decreases, while there is a noticeable increase in the number of subscriber agreements with access to fast broadband (30 Mbps <download <100Mbps). There is also a slight increase in the number of subscriber contracts with access to ultrafast broadband (download> 30Mbps).

The significant increase in the number of subscriber contracts with access to fast and ultra-fast broadband was stated in the previous report of the NBCO (September / 2021) because in the period when this report refers to, one operator increased the transmission speeds for the same value of the monthly subscription.

- Number of active subscribers to Connected Service Packages

Chart 5. Number of subscribers to Connected Service Packages

	Two Service Package (Double play)		Three Service Package (Triple play)		Four Service Package (Quadruple play)	
	Households	Business Entities	Households	Business Entities	Households	Business Entities
<b>MARCH 2020</b>	119,319	14,532	143,352	16,259	88,588	638
<b>MARCH 2021</b>	122,314	15,765	164,754	17,637	78,657	0
<b>SEPT. 2021</b>	125,419	17,165	167,181	17,951	82,874	0
<b>MARCH 2022</b>	129,350	19,454	164,505	18,201	85,741	0

(Source: AEC)

Chart 5. Displays that households mostly use three service packages (Tripple play), while business entities use approximately the same packages with two and packages with three services, and they no longer use four package services (Quadruple play).

The largest increase is in the use of three service packages by households, as shown in the graph in Figure 19.

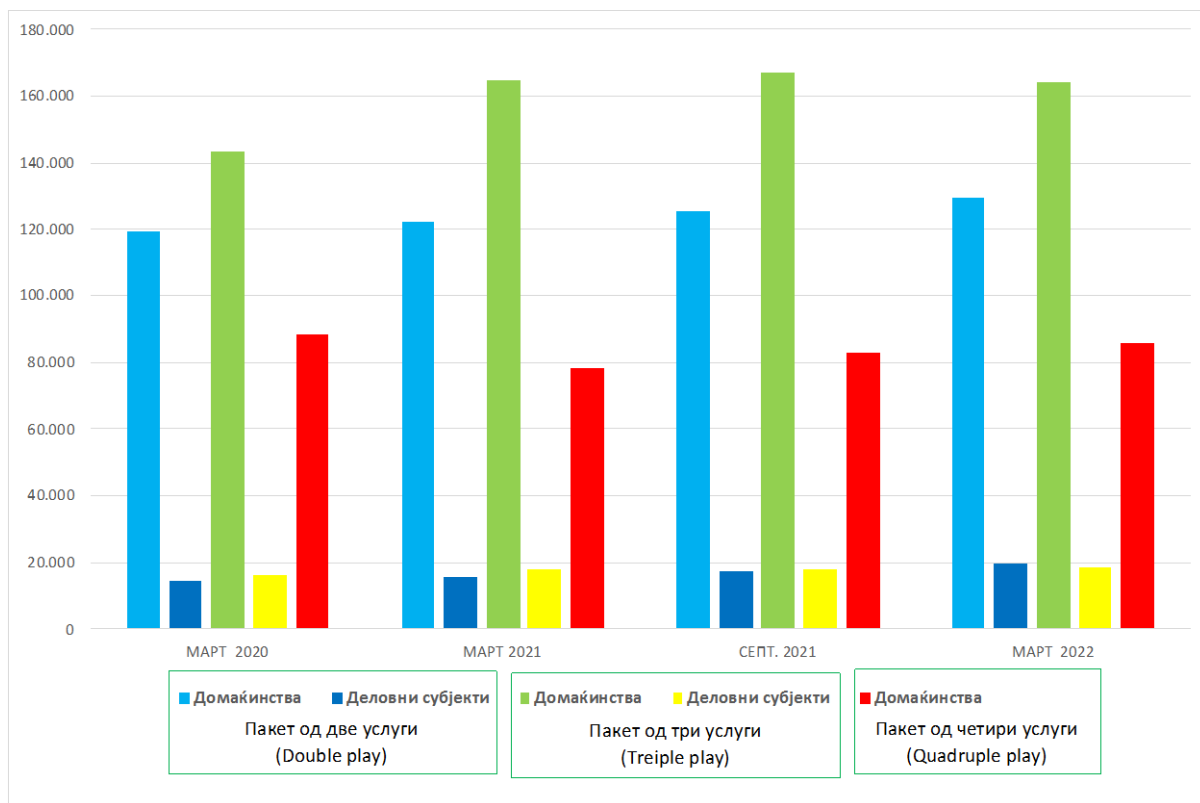


Figure 19: Number of active subscribers to Connected Service Packages (Source: AEC)